

LIX.—Notes made during the Summer of 1887 on the *Effect of offering various Insects, Larvæ, and Pupæ to Birds.* By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

A FEW weeks ago I received an envelope by post containing all the letters and notes which I sent to Mr. Poulton in 1887. No word of explanation accompanied this missive; and although such an action appeared hardly in accordance with my, perhaps strained, ideas of strict courtesy, I could not but presume that the envelope must have been forwarded by Mr. Poulton.

That the short communication which I published in the 'Annals' for August should be assumed to be intended for a personal attack upon Mr. Poulton never entered my head; indeed, I supposed that he, in common with all who delight in the study of natural history, would have welcomed any facts, even though apparently adverse to a pet theory, which tended to throw light upon a subject which he had long and eagerly studied.

Few things ever astonished me more than the hostile attitude which Mr. Poulton assumed with regard to that innocent paper, or the cruel misconstructions which he put upon the most harmless remarks made therein; that my comment touching the repeated reproduction of a few comparatively unimportant observations of my own should have been dislocated into a claim to the origination of Wallace's theory is too absurd to be considered seriously. In spite of my much-valued friend Mr. Weir's careful experiments, as also those of Messrs. Fritz Müller, Weismann, and Poulton, I still insist that, so long as a few desultory observations are incessantly forced into a front place, it is an evidence of how little has hitherto been done, upon which to establish the truth of a theory; many more observers are wanted, and all their observations must be *impartially* treated if we are to arrive at exact scientific truth.

I was not aware that Mr. Poulton had made a selection of "the most interesting results" of my recent experiments for publication in the Report of the British Association, or I should not have said "so far nothing seems to have come of it;" nevertheless, as it is impossible for any one man to judge how far even apparently uninteresting results may eventually tell for or against a theory—as, too, Mr. Poulton has evidently forgotten some of those facts when he comments upon *Zeuzera aesculi* and the size of the spiders offered to

birds*,—I think I cannot do better than publish the whole of my observations in detail.

I may mention here that in my late paper, whilst speaking of the behaviour of my birds when confronted with *Zeuzera æsculi*, I had quite forgotten how eagerly in years past my Bulbul had devoured the species. How Mr. Poulton overlooked the fact that my tiny Waxbills did not hesitate to attack a full-grown (female of) *Epeira diademata* on the 4th September I cannot say; it is only one out of numerous instances which I could adduce to show that even the smallest birds do not consider size where they see a luxury before them. Wagtails are nervous over large spiders, but Blue Tits, Robins, Nightingales, and numerous other insectivorous birds prefer them to small ones; even the most awful-looking *Tegenaria domestica* is eagerly seized by a Blue Tit, and the poplar hawk-moth has no chance in an aviary with that plucky little acrobat.

The notes which I now propose to publish *in extenso* commence in the form of letters written to Mr. Poulton, and are, by that gentleman's wish, continued in the form of a diary. In the original MS. I recorded everything, whether interesting to Mr. Poulton or not, because it saved me from keeping a double diary; as, however, the account of my purchases or losses by death are not to the purpose (since the causes of death proved to be in no way connected with diet), I do not think it necessary to repeat them here.

I may mention that, previous to the preparation of my notes, Mr. Poulton was kind enough to express his willingness that I should put them in print myself, and although I did not then wish to do so, his late irritation at my publication of a few facts has somewhat altered my intention. It is true that my birds at the present time are in a more natural condition than they were in 1887, since at that time they were in rather a confined space, whereas now they have abundance of room for flight and opportunities for catching much insect-food; but in 1887 my birds were by no means ever allowed to be hungry, and not a few of them, and more especially the finches, when opened after death, have shown too clearly that excess of good living has been the sole cause of their demise.

I shall now proceed to quote from the letters containing my earlier notes, and then pass on to my regular diary. My first letter refers to one or two footnotes to Mr. Poulton's paper in the 'Proceedings of the Zoological Society' (in which he

* One might imagine from Mr. Poulton's remark that the larva of *Stauropus fagi* left the egg full-grown.

appears to doubt the probability of lizards eating the males of *Orgyia antiqua* or the moths of *Abraaxas grossulariata*), as follows:—"I frequently hung up the newly emerged *Orgyia* females in my lizard-house, and as the doors were not made by a cabinet-maker, but by myself, there was plenty of room for the males to squeeze through; the lizards used to sit by the door, after seeing two or three males enter there, and regularly snap them up and swallow them as they entered the cage or vivarium; I have seen this dozens of times, and am not mistaken, nor, for that matter, am I in the case of *A. grossulariata*; indeed, I accounted to myself for the fact that the imago was eaten where the larva was rejected, on the supposition that the acidity of the larva was derived from the gooseberry and that it had passed away during the pupal stage."

"Now, as to my birds: I have at present 95, of 32 species*, and I have had the young of several other species during the year, only they have died.

"*Cerura vinula*, larva.—Fought for, shaken to death, banged on the floor of the cage (as a Thrush bangs a snail), the viscera devoured as shaken out, the blood pecked even from the walls, and the elongated skin finally swallowed whole [by three young Nightingales]. The tails did not deter the Nightingales from attacking this larva for a second; indeed, they seized upon them as handles to pull by, much to my astonishment, for they are somewhat spiny.

"*Mamestra brassicæ*, larva.—Eaten by all birds; but Wry-necks will not pick up any but the green variety; the others they will swallow when their beaks are opened and the larvæ administered as pills.

"*Orgyia antiqua*, larva.—Eaten without hesitation (but always after rubbing on the ground) by my Missel-Thrush.

"*Halia wavaría* [larva].—Eaten by Nightingales, Skylarks, Thrushes, Canaries.

"*Biston hirtaria*, larva.—Eaten by *Leiothrix* (the Pekin Nightingale).

"*Ganoris brassicæ* and *rape* [imago].—Eaten by Nightingales, Thrushes, Starlings, Blackbirds, Sedge-Warbler, Weaver-birds, *Leiothrix*; examined by Canaries, which, however, were startled by their sudden movements; eagerly looked after by various species of *Estrelda* (small Waxbills), but I would not trust so large a Lepidopteron with such timid little creatures.

* I subsequently purchased others, bringing the number at one time up to 108; but many died before the end of the year, chiefly of typhoid fever.

"*Triphaena pronuba*, *Hepialus humuli*, *Cossus ligniperda*, *Zeuzera aesculi*, and *Apamea didyma* (all imagines).—Eaten with the greatest relish by a Persian Bulbul [*Pycnonotus leucotis*].

"As regards flies (*Musca domestica*), I never saw anything like the eagerness which the Nightingales, Sedge- and Willow-Warbler showed for them, eating them in all stages (I had about half a pint of their maggots sifted out of a heap of refuse from the cages); the maggots were also greedily picked up by my Wrynecks.

"Finches will eat any green caterpillar and all varieties of *Mamestra brassicae*; the Indigo Finch of North America and the Chaffinch prefer them infinitely to mealworms.

"As regards other insects, the common broad centipede (*Lithobius forficatus*) is greedily eaten by *Leiothrix* and the Brambling; the latter bird will eat almost anything, even including Woodlice, which most birds reject after pinching them*, and I verily believe it would eat the nauseous kinds; it would be a good bird to try with.

"Earwigs are eaten by all birds [which are] quick enough to pick them up; several species of plant-bugs (evil-smelling) and a *Coccinella bipunctata* were eaten by my *Leiothrix*.

"*Pterostichus madidus*.—Greedily broken up and devoured by my Nightingales.

"I found the larvæ of *Hyponomeuta padella* and an allied species from the hedges almost invariably rejected by most birds; the Nightingales would sometimes eat them when hungry †; on the other hand, my Rose-Finch (*Carpodacus*) devoured them with avidity."

My second letter contained a few additional notes:—

"I gave the larva of *Spilosoma menthastri* to my Missel-Thrush yesterday, and he seized it immediately, rubbed it about on the earth to get rid of the hair, and swallowed it. I do not think that most birds would eat hairy caterpillars; a friend informed me yesterday (Mr. H. Powell) that his fowls invariably refuse them. I should be almost afraid to try the Nightingales, as they are such voracious little fellows that they might swallow them heedlessly and kill themselves; and this brings me to your question as to their age. They were hatched about the first week of June, taken from the nest when nine days old, and I got them the following day; they have therefore been full-grown since about the third week in July; indeed, the day after the feast on *Cerura* I

* Quite recently I noticed my Blue Tits eating them with avidity.

† Being very voracious, this was sometimes possible to them.

had to separate them, in consequence of their fighting almost incessantly in the vicious manner of adult birds.

“With regard to *Orgyia* ♀: my lizards never ate it, and I could not understand why, as they must sometimes have seen it hanging on a bramble-leaf in the vivarium or feebly kicking on its back after laying its unfertilized eggs.

“My sole remaining Wryneck is at present strong and lively, and readily picks up caterpillars, especially green ones; mealworms and earwigs it licks, but they are too smooth and hard-shelled to suit its taste. I find, however, that it will eat the common house-fly in all stages, including the pupa, which it picks up with its bill, not with its tongue.

“As to instinctive likes or dislikes: my little Sedge-Warbler is fond of *Pieris brassicæ*, chases him over the cage until he has pinned him down, and then knocks him about until little more than the body remains, and this he swallows; in his natural state I do not believe the Sedge-Warbler would even look at anything so big, there being plenty of small flies and spiders amongst the reeds and sedges. I much doubt whether a Missel-Thrush would chase a white butterfly if at liberty; but in a large cage he does so in the most reckless manner, sometimes quite damaging his appearance by cutting his face against the wires in his eagerness to seize his prey.

“Generally speaking, when I say that an insect is eaten by any species, it has not been tried with any other; in the case of *Pterostichus madidus*, however, the Missel-Thrush has eaten it; he and the Nightingales have both eaten the common cockroach with evident relish.

“About a month since a man brought me about a dozen full-grown larvæ of the large cockchafer (*Melolontha*), which were greedily eaten by the Missel-Thrush, Song-Thrush, Blackbird, Skylark, and Bulbul; the dirty stains all over the walls of their cages remain to this day.

“Yesterday my Missel-Thrush and one of my Starlings took the grey-tailed humble-bee, and after a few rubs swallowed them whole; the Starling certainly swallowed his alive and kicking.”

My third letter merely gives the results recorded on the first day of my diary, which commenced on the

16th August.

Offered larva of *Acronycta alni* to Missel-Thrush; crushed and contents eaten; skin left.

Vanessa urticae (larva).—Offered to Weaver-birds and Brambling; rejected without trial. To Nightingale; killed

and swallowed, ejected and again swallowed. To Song-Thrush ; thoroughly crushed and then swallowed.

Pupa of *V. urticae* to Missel-Thrush, Bulbul, and Starling ; crushed and eaten with evident relish. To Skylark, *Leiothrix*, and Nightingales ; contents swallowed, the shell left.

Imago of *V. urticae* to Missel-Thrush, Song-Thrush, *Leiothrix*, Starlings, Blackbird, Bulbul, and Nightingale ; eaten by all with pleasure excepting the Blackbird, which hesitated before finishing it. On the other hand, it was rejected without trial by the Sedge-Warbler, Wryneck, Cape Canary, and Rose-Finch.

17th August.

Offered larva of *V. urticae* to Missel-Thrush, which rubbed it about and then swallowed it. To *Leiothrix*, which swallowed the contents but rejected the skin. Three Nightingales and a Starling eagerly devoured the larvæ entire ; a Chaffinch ate part, but did not seem to relish it.

Pupa of *V. urticae* to Chaffinch, which pecked but rejected it. Two Siskins, two Cordon-bleus and sixteen other Waxbills (*Estrellda*, spp.), four *Munia rufo-nigra*, two other *Munias*, and the Rose-Finch entirely ignored them. On the other hand, two Nightingales and a Skylark seized and ate them at once.

Imago of *V. urticae* to Missel-Thrush, Nightingale, Indigo Finch, and Chaffinch, all of which ate it without hesitation. It was, however, rejected by the Sedge-Warbler, and my eighteen Waxbills were all afraid of it.

18th August.

Offered pupa of *V. urticae* to Missel-Thrush, four Song-Thrushes, Blackbird, Bulbul, and Nightingale ; eaten by all without hesitation ; it was ignored by the Wryneck.

Imago of *V. urticae* to Nightingales, which ate them at once.

Offered earwig to Sedge-Warbler ; not eaten.

19th August.

Offered larva of *Mamestra brassicae* to Sedge-Warbler, which at once seized and devoured it. A spider (*Attus*, sp.) was also eaten without hesitation. A second larva of *M. brassicae* was offered to the Wryneck, but, being of the brown variety, he licked but did not eat it ; the Sedge-Warbler took it directly.

20th August.

Brown variety of larva of *M. brassicæ* again rejected by Wryneck.

21st August.

Grey-tailed humble-bee eaten by Missel-Thrush; larvæ of *Mamestra brassicæ* by Wryneck!, Sedge-Warbler, Nightingales, and Indigo Finch; larva of *Ganoris rapæ* by Sedge-Warbler; butterflies of *G. rapæ* and *brassicæ* by Nightingales, Sedge-Warbler, Bulbul, *Leiothrix*, Starling, Blackbird, and Thrushes; refused by Cape Canary, Common Canary, Chaffinch*, and Weaver-birds; an evil-smelling brown plant-bug eaten by *Leiothrix*, and various spiders (*Theridion* and *Epeira*) by Sedge-Warbler.

23rd August.

Larvæ of buff ermine moth given to Missel-Thrush; played with (as a cat plays with a mouse), then rubbed about to get rid of the hair, and eaten. Larva of *G. brassicæ* offered to Wryneck; licked, but I believe not eaten. Harvest-spider eaten by Nightingale.

24th August.

Epeira diademata eaten by Nightingale, but not swallowed whole as a mealworm would be; red-tailed humble-bee offered to Missel-Thrush, but ignored.

25th August.

Caterpillar of buff ermine given to Blackbird; rubbed about in the sand and then eaten. *Oniscus asellus* and earwigs eaten without hesitation by Nightingales; numerous caterpillars of *Apamea didyma* eaten with avidity by Sedge-Warbler, Wryneck, and Rose Finch; caterpillars of *Ganoris rapæ* eaten with evident pleasure by Wryneck.

28th August.

Gave caterpillar of buff ermine to Song-Thrush; killed at once and subsequently eaten, though not immediately. A second caterpillar offered to Weaver-birds, which ignored it; they also rejected a larva of *Ganoris brassicæ*, which, however, was at once eaten by the Missel-Thrush; a caterpillar of *G. rapæ* was killed and partly eaten by the Indigo Finch and finished by the Chaffinch; others were again eaten by

* This is curious, because the same Chaffinch now eats these butterflies with the greatest pleasure.

the Wryneck and Sedge-Warbler; *Epeira diademata* by Nightingales, Indigo Finch, and Chaffinch, and a small one by Cordon-bleu (Red-eared African Waxbill). The Waxbills never refuse spiders.

29th August.

Caterpillars of *Ganoris brassicæ* given to Nightingales; killed but not eaten. The Song-Thrush and Starling, however, ate them without hesitation. Caterpillars of *G. rapæ* again eaten by Wryneck.

30th August.

Caterpillars of *G. brassicæ* eaten by Missel-Thrush, Song-Thrush, and Starling, rejected by Indigo Finch; again killed but not eaten by Nightingales; caterpillars of *G. rapæ* eaten by all my soft-billed birds, by the Indigo Finch, and Chaffinch. A caterpillar of *G. brassicæ* was rejected by a pair of Orange Weavers, but they were both at the time in a dying condition.

31st August.

Caterpillars of *G. brassicæ* killed and the contents (but not the skin) eaten by Bulbul; swallowed entire by Missel-Thrush; eaten, apparently without relish, by Song-Thrushes; killed but not eaten by Blackbird; caterpillars of *G. rapæ* eaten as before by all soft-billed birds, Indigo Finch, and Chaffinch; small spider (*Tegenaria*, sp.) eaten by Sedge-Warbler; caterpillars of *Mamestra brassicæ* were eaten by many of the birds, but I have never known this species altogether refused by any insectivorous bird in good health; the Wryneck alone objects to the brown variety, but he will get over this in time I believe.

4th September.

Largest-sized *Tegenaria domestica* given to Nightingales, Missel-Thrush, and Bulbul, and eaten with the greatest relish; large specimen of *Epeira diademata* eaten by Waxbills; earwigs eaten by Nightingales.

6th September.

Gave caterpillar of *Cossus ligniperda* to Missel-Thrush, which tasted but did not relish it; took it away and offered it to Blackbird, which ate it at once and made the whole place smell horribly. Gave caterpillars of *Ganoris brassicæ* to Missel-Thrush and Starling; the former swallowed them whole, the latter tasted and then rejected them.

7th September.

Again gave caterpillars of *G. brassicæ* to Missel-Thrush, Nightingales, and Starlings; the Starlings treated them as before, but the others ate them at once. Specimens of *Epeira diademata* eaten by Cordon-bleu and Nightingale; earwig by Nightingale.

9th September.

Caterpillar of *G. rapæ* offered to *Leiothrix*, but ignored; eaten at once by Nightingale and Wryneck. A wasp flew into young Thrush's cage, was at once seized and killed; the Thrush apparently was stung, as it dropped the wasp and abruptly retired to the back of the cage; subsequently he returned and ate the wasp.

10th September.

Caterpillars of *Mamestra brassicæ* eaten by Wryneck! and Nightingales; caterpillar of *Pygæra bucephala* by Missel-Thrush.

11th September.

Caterpillar of *Orgyia antiqua* eaten by Missel-Thrush; of *G. rapæ* by Wryneck, Nightingales, and Robin; of *Mamestra brassicæ* by Wryneck and *Leiothrix*; *Epeira diademata* by Cordon-bleu.

At this point I went away from home, and nothing worth recording occurred until the 18th, when I again gave a caterpillar of *Orgyia antiqua* to the Missel-Thrush, which rubbed it about and ate it; *Eristalis tenax* was eaten by Nightingales*. *Quedius tristis* was also swallowed immediately when offered to *Leiothrix*; a caterpillar of the buff ermine was unaccountably refused by the Missel-Thrush, but eaten by the Blackbird.

19th September.

Eristalis again eaten by Nightingales and earwigs by *Leiothrix*; caterpillars of *Ganoris brassicæ* eaten by Missel-Thrush and Starlings; tasted but rejected with disgust by Nightingales; licked but refused by Wryneck.

21st September.

Eristalis offered to Brambling and Rose-Finch; refused by both, the latter being evidently alarmed by its appearance;

* This year (1889) I have given many to Wagtails, Great Tits, the American Nonpareil, and various Weavers, all of which ate them, the Weavers alone showing the least suspicion of them.

seized and eaten with evident pleasure by Indigo Finch. (N.B.—All these birds are moulting and therefore out of condition.) Earwigs eaten by Robin and *Leiothrix*, refused by Rose-Finch.

At this point, having purchased many birds to replace losses amongst my Finches, I numbered 108 birds.

22nd September.

Eristalis eaten with pleasure by Indigo Finch and *Leiothrix*, Nightingales, Robin, Bulbul, and Missel-Thrush; ignored by Orange-Weavers, Wryneck, Rose-Finch, and Song-Thrush; examined but refused by Waxbills; killed at once and reluctantly eaten by Starling. Full-grown *Epeira diademata* seized and greedily eaten by Robin, ignored by Orange-Weavers.

25th September.

Gave an imago of *Phlogophora meticulosa* to *Leiothrix*; the cock bird flew down and examined it attentively for some time, evidently half deceived by its leaf-like appearance; eventually he pecked it, and, becoming convinced of its edibility, tore it to pieces and devoured it with great satisfaction. Earwigs were eaten by *Leiothrix*, Nightingales, Bulbul, Robin, and Starling; a number of small spiders and young larvæ of *Apamea didyma* eaten by Waxbills.

26th September.

Epeira and *Agelena* eaten with pleasure by Robin, Nightingales, *Leiothrix*, and Waxbills.

27th September.

Eristalis eaten by *Leiothrix*.

28th September.

Eristalis again eaten by *Leiothrix*, Robin, and Nightingales; rejected after examination by Waxbills.

29th September.

Caterpillar of buff ermine offered to Missel-Thrush but ignored; seized at once by Blackbird, passed backwards and forwards between his beak until nearly all the hairs were rubbed off, then swallowed.

30th September.

Caterpillars of *Mamestra* and *Apamea* eaten by Waxbills.

1st October.

Caterpillar of *Mamestra persicariæ* offered to Wryneck ; licked, but rejected ; immediately eaten by Nightingale.

2nd October.

Quedius eaten by *Leiothrix*.

3rd October.

Caterpillar of *Mamestra persicariæ* rejected (as too large to swallow) by Wryneck ; eaten at once by Nightingale.

5th October.

Caterpillar of *Spilosoma menthastri* eaten by Blackbird.

After this date nothing occurred worth recording, as I found it difficult to obtain insects of any kind with the exception of mealworms and a few house-flies.

It is noteworthy, from an examination of the above records, that no insect in any stage excepting the red-tailed humble-bee (which, by the way, I only offered to the Missel-Thrush) was rejected by all my birds ; those insects which were refused by certain species were eagerly devoured by others, so that it was impossible to conclude that any of them enjoyed perfect immunity from destruction. In the second place, so far from my birds learning by experience to reject with scorn that which they had proved to be unpalatable, I found that in some instances they seemed to acquire a taste for larvæ previously refused. Birds are very intelligent, but their memories are ridiculously short.

LX.—*A new Species of Rhax.* By R. I. POCOCK,
of the British Museum (Natural History).

Rhax semiflava, sp. n.

Clothed with more or less golden hairs.

Colour.—The cephalic plate and chelicerae chocolate-brown ; thoracic membrane white ; sides of the abdomen paler brown ; first five abdominal tergites dark brown on the upper surface ; the succeeding four tergites pale testaceous above ; the anal somite wholly blackish ; under surface of the body wholly testaceous. Legs mostly testaceous ; the maxillary palpi with chocolate-brown tarsus and metatarsus ; the first pair of legs with brown terminal segment ; dactyli of chelicerae and ocular tubercle black.

Chelicerae.—Movable digit bearing a minute tooth in front of the large principal tooth, and with a single small